

Interactive comment on “Reconstruction of track and simulation of storm surge associated with the calamitous typhoon affecting the Pearl River Estuary in September 1874” by Hing Yim Mok et al.

Anonymous Referee #1

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This is a very readable paper; it also presents a good case of data rescue and applies it to a potential hazard risk (storm surge/tide risk) estimate. The authors have made clear descriptions on the data collection, which is very good considering its historical nature. But I still have some concerns and suggestions for authors to rethink about their approach and propose for the study.

Based on the pressure and wind reports at four locations in HK and Macao, and information from Luzon, it is not difficult for one (with atmospheric training) to picture the likely track of the typhoon 1874 when approaching and passing this region. As authors also revealed, the track of typhoon 1874 was not uncommon. Of course, it is good and

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encouraging that the authors are able to use further information and model to estimate and simulate the typhoon track and feed data into SLOSH to model maximum storm surge and tide of the typhoon. But what worried me the most are also the purpose for doing so and the great model uncertainty.

If my interpretation is correct, the authors want to use this super typhoon as said by them to exemplify that the potential storm surge and tide in HK and Macao can be much higher than what records have told us after 1883. If this is true, then the information is further important. However, given the topography and bathymetry they used are from the 1990s, I am afraid that the result could be overestimated and exaggerate the risk potential. Here are some reasons: (1) the numbers of height are way too higher than the descriptions in the historical documents and the time series pattern are also inconsistent. (2) The topography of Pearl River Estuary can change quickly in just several decades as other significant rivers in China, Taiwan and southeast Asia have revealed. Coastline changes usually accompany a large area of new tidal land which often experienced fast development and urbanization in the later centuries. Thus, if the purpose of the study is to give a realistic estimate of the storm surge/tide hazard risk, the authors need to seriously take this issue into account. Otherwise, it will be irresponsible to just give the tremendous numbers based on the simple model results. Also, I found it actually not difficult to find old HK maps dated back to the 19th century when doing a bit search myself.

In a word, this paper can potentially present a serious deficiency if the authors aim to simulate storm surge and tide brought by the typhoon 1874. This deficiency can result in overestimation and even distortion of the real situation. Further data especially those on topography and bathymetry are strongly recommended to be applied in the analysis. Or at least, the authors need to give a comprehensive explanation on the model results and give different scenarios (based on the further information) and uncertainty estimates.

Minor points: Figure 6 is unclear, further explanation is needed. Some detailed maps

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are not necessary e.g. Figure 3. Figure 2 is provided without descriptions. Actually this can be used to explain present and 1800s topography in HK. Figure 8&9 are poorly explained: why the green and red curves drop down suddenly after peak and rise again after the down point by 6am (North Point)and then 8am (Tai Po Kau)? Line 78-80 on page 3 “which was on average 7 hours 36 minutes and 41 seconds ahead of UTC. . .”. Can you explain why and how such exact time was calculated here?

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